New Jersey
Department of Transportation
1035 Parkway Avenue • CN 600 • Trenton, New Jersey 08625-0600
Christine Todd Whitman, Governor
Frank J. Wilson, Commissioner

Flexible Delineators
ADU 94028

October 31, 1995

MEMORANDUM
All Design Units

Subject: Revision to the 1989 Standard Specifications, Subsection 618.06 Delineators

Reference: ADU Memorandum to All Design Units entitled, "Proposed Revision to the 1989 Standard Specifications, Subsection 618.06", dated February 22, 1994.

The Supplementary Specifications for projects which require Flexible Delineators shall include the revised Standard Specification (GETFILE) 61806 FLEXDLN2. The revised specification allows for the expanded use of Flexible Delineators on permanent barrier curb and beam guide rail. Flexible delineators shall be used on projects subject to the following guidelines.

A. Flexible Delineator Guide Posts

1. Flexible delineator posts shall be installed on all new and reconstructed freeway and interstate highways.

2. On existing, land service, freeway and interstate highways, metal delineator posts shall be replaced with flexible delineator posts on all 3R projects greater than one half mile in length.

3. At interchanges of freeways and interstate highways within areas of work as specified in 1 and 2 above, flexible delineator posts shall be provided along all acceleration and deceleration lanes including taper sections on the connecting highway or street.

4. The location and spacing of flexible delineator posts shall be in accordance with the Department's Standard Roadway Construction Details and Supplementary Specifications.

B. Guide Rail Mounted Delineators

1. Flexible delineators shall be installed on beam guide rail on land service highways, freeways and interstate highways.

2. White delineators shall be provided on the right side of mainline and ramps. Amber delineators shall be provided on the left side of mainline and ramps.

3. Guide rail delineators shall be installed when the guide rail offset from the edge of pavement is 8 feet or less on land service roads and 10 feet or less on freeways and interstate highways.

4. Delineator spacing shall be 81.9' (13 sections of guide rail) for tangent section of roadway and 44.1' (7 sections of guide rail) for horizontal curve section of roadway with radii less than 1910'.

5. The first delineator shall be placed on the guide rail end treatment, and positioned so that the reflector area is facing the direction of traffic. Continue required spacing as in note 4.

6. If a parabolic flare is present, the second delineator shall be placed at the end of the flare section of guide rail. Continue required spacing as in note 4.

7. When the distance between the end of the guide rail and the previous delineator is greater than 20' for 44.1' spacing, and 40' for 81.9'spacing, place delineator on last post or end treatment.

8. If guide rail section is less than 40' in length, a delineator shall be placed at the beginning and the end of the guide rail.

9. Where guide rail delineation is present, the existing delineators shall be removed if the delineators are not in conformance with this policy.

C. Barrier Curb Mounted Delineators

1. Flexible delineators shall be installed on permanent barrier curb on land service highways, freeways and interstate ramps.

2. Amber delineators shall be placed on the side of the median barrier, 3 inches from the top, to delineate traffic in both directions.

3. Delineator Spacing will be 80' for all roadways. The first delineators shall be placed at the beginning of barrier curb.

4. If the distance between the end of the barrier curb and the adjacent delineator is greater that 40', install the delineator at the end of the barrier.

5. Where median barrier delineation is present, the existing delineators shall be removed if the delineators are not in conformance with this policy.

Installation and positioning of the flexible delineators shall be in accordance with the attached revised specification.

To incorporate the GETFILE for Flexible Delineators into the Supplementary Specifications, the following shall be inserted after line 6386 of SI89ROAD8:

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H     **********************************************************************************************
H          INCLUDE THE FOLLOWING FOR PROJECTS WITH
H          FLEXIBLE DELINEATORS
H     .....G 61806 FLEXDLN2                                                          (ADU 103195)
H          CHECK FOR TEXT TO BE INCLUDED IN       SPRUF (  )     MASTERS (  )
H     **********************************************************************************************
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The following shall be inserted after line 8569 of SI89ROAD8:

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X THIS.SUBSECTION IS DELETED.
X
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In conjunction with the above, lines 6387 thru 6399, and 8570 thru 8576 inclusive of SI89 ROAD8 are deleted.

The text of GETFILE 61806 FLEXDLN2 and revised Standard Construction Detail CD-47 are attached. Standard Construction Detail Sheet CD-46 is eliminated. The above referenced Memorandum to All Design Units, dated February 22, 1994 is hereby superseded.

Recommended by:

Robert K. Suess, Manager
Bureau of Roadway Plans
and Specifications

Approved:

Charles Takacs, Director
of Roadway Design (Chief
Engineer of Roadway Design)

Attachment
Implementation Code C
CRT:RKS:SNA:aw

THIS SUBSECTION IS CHANGED TO:

FLEXIBLE DELINEATORS

DESCRIPTION.

THIS WORK SHALL CONSIST OF FURNISHING, ASSEMBLING AND ERECTING FLEXIBLE DELINEATORS.

MATERIALS.

UNITS FOR FLEXIBLE DELINEATORS SHALL BE MADE OF A FIBERGLASS REINFORCED, THERMOSETTING, HIGH POLYMER RESIN, AN EXTRUDED POLYCARBONITE RESIN, OR OTHER MATERIALS WHICH MEET THE FOLLOWING MINIMUM PHYSICAL AND PERFORMANCE REQUIREMENTS:

1. DIMENSIONS.

THE UNIT FOR THE GROUND MOUNTED FLEXIBLE DELINEATOR SHALL HAVE A 3" MINIMUM WIDTH WITH A 0.125" MINIMUM THICKNESS; AND THE UNIT FOR THE GUIDE RAIL MOUNTED DELINEATOR SHALL HAVE A MINIMUM WIDTH OF 3" WITH A MINIMUM THICKNESS OF 0.095". THE UNIT FOR THE GUIDE RAIL MOUNTED DELINEATOR SHALL HAVE A HEIGHT SO THAT THE TOP OF THE REFLECTIVE SURFACE FOR SINGLE REFLECTORS IS 32" AND 40" FOR DOUBLE REFLECTORS FOR DECELERATION AND ACCELERATION LANES, ABOVE THE NEAR ROADWAY EDGE WITH A 2" TOLERANCE OF SPECIFIED HEIGHT. THE UNIT FOR THE GROUND MOUNTED DELINEATOR SHALL HAVE A VARIABLE HEIGHT SO THAT THE TOP OF THE REFLECTIVE AREA IS POSITIONED 4' ABOVE THE NEAR ROADWAY EDGE.

THE UNIT FOR THE BARRIER CURB MOUNTED DELINEATOR SHALL HAVE A 3 1/2" MINIMUM WIDTH. THE UNIT FOR THE BARRIER CURB MOUNTED DELINEATOR SHALL BE ATTACHED TO THE SIDE OF THE BARRIER CURB, 3" FROM THE TOP USING A METHOD RECOMMENDED BY THE MANUFACTURER OF THE BASE AND PANEL.

THE PANEL FOR GUIDE RAIL MOUNTED FLEXIBLE DELINEATORS SHALL BE A RIGID PVC, FIBERGLASS OR PLASTIC COMPOUND, RESISTANT TO ULTRAVIOLET LIGHT, AND SHALL HAVE DIMENSIONS OF 3 INCHES MINIMUM WIDTH, WITH A 0.095 INCHES MINIMUM THICKNESS. THE BASE OF THE UNIT DESIGNED TO MOUNT OVER THE I-BEAM SPACER OR TO THE TOP OF A WOOD, POLYMER OR OTHER TYPE OF SPACER OF BEAM GUIDE RAIL. THE BASE AND THE PANEL SHALL BE DESIGNED TO WITHSTAND REPEATED IMPACTS, AFTER WHICH, THE PANEL RETURNS TO ITS FUNCTIONING POSITION (90 DEGREES FROM THE PLANE OF THE ROADWAY SURFACE).

THE BARRIER CURB MOUNTED FLEXIBLE DELINEATORS SHALL BE THE SAME AS FOR GUIDE RAIL MOUNTED FLEXIBLE DELINEATORS EXCEPT THAT

THE PANEL SHALL BE 3 1/2" HIGH BY 3 1/2" WIDE BY 0.095" MINIMUM THICKNESS AND THE BASE SHALL FORM A "T" SHAPE WITH THE PANEL.

THE SHAPE OF THE GROUND MOUNTED UNITS SHALL BE CONDUCIVE TO PROTECTION OF THE APPLIED RETROFLECTIVE SHEETNG FROM ABRASION.

2. COLOR.

WHITE, OPAQUE OR AMBER IN COLOR, RESISTANT TO ULTRAVIOLET AND INFRARED RADIATION.

3. IMPACT RESISTANCE.

UNITS SHALL BE SELF-ERECTING TO WITHIN 10 DEGREES OF ORIGINAL UPRIGHT POSITION WITHIN 15 MINUTES OF IMPACT ON FIVE SEPARATE OCCASIONS BY A VEHICLE TRAVELLING AT 55 MILES PER HOUR. TESTS SHALL BE CONDUCTED AT ZERO DEGREES, 22 DEGREES AND 45 DEGREES, VARIANCE OF THE LONG CROSS-SECTIONAL AXIS OF THE UNIT TO THE PERPENDICULAR OF VEHICLE DIRECTION. THE SAME UNIT(S) SHALL BE USED FOR ALL ANGLE IMPACT TESTS, TOTAL IMPACTS PER UNIT EQUALING FIFTEEN (15). THE RE-ERECTED UNIT SHALL RETAIN THE ORIGINAL CROSS-SECTION, SHOW NO EVIDENCE OF SHREDDING OR SPLINTERING, AND SHALL RETAIN 80 PERCENT OF ORIGINAL RETROREFLECTIVE SHEETING.

4. HEAT RESISTANCE.

A UNIT SHALL BE CONDITIONED IN AN OVEN FOR TWO HOURS AT 140 DEGREES F PLUS OR MINUS 3 DEGREES. AFTER REMOVAL FROM THE OVEN, THE UNIT SHALL BE BENT BACKWARDS AT 90 DEGREES FROM THE UPRIGHT SIMULATING A FIELD HIT. THE UNIT SHALL, WITHOUT CRACKING, RECOVER TO ITS ORIGINAL POSITION WITHIN 10 SECONDS FOR EACH OF THREE BENDS. TESTING SHALL BE COMPLETE WITHIN 2 MINUTES. COLOR SHALL REMAIN UNCHANGED.

5. COLD RESISTANCE.

THE SAME UNIT(S) TESTED FOR HEAT RESISTANCE SHALL BE TESTED FOR COLD RESISTANCE. THE UNIT SHALL BE CONDITIONED FOR 24 HOURS AT ZERO DEGREES F, THEN SUBJECTED TO THE SAME TESTING AS FOR HEAT RESISTANCE. THE UNIT SHALL CONFORM TO THE SAME RECOVERY AND COLOR RETENTION STANDARDS AS FOR HEAT RESISTANCE.

6. WEATHER RESISTANCE.

A UNIT SHALL BE EXPOSED TO 1,000 HOURS WEATHERING IN ACCORD-ANCE WITH ASTM G26 WITH NO SIGNIFICANT DISCOLORATION.

7. INSTALLATION.

THE UNIT FOR GROUND MOUNTED DELINEATORS SHALL BE CAPABLE OF BEING DRIVEN INTO THE GROUND BY ONLY ONE PERSON TO PROPER DEPTH WITHOUT DAMAGE TO THE UNIT. FOR GROUND MOUNTED DELINEATORS, NO STEEL PARTS SHALL BE ABOVE GROUND. ALL SPECIAL TOOLS FOR PILOTING, HAND DRIVING AND DRIVING AND REMOVING SHALL BE COMPATIBLE WITH THE DRIVEABLE FLEXIBLE UNIT. THE UNIT SHALL REMAIN IN THE POSITION IN WHICH IT IS INSTALLED. FOR ATTACHMENT ON BEAM GUIDE RAIL OR BARRIER CURB, ALL SPECIAL FITTINGS, ATTACHMENTS AND/OR SPECIAL TOOLS SHALL BE COMPATIBLE WITH THE FLEXIBLE DELINEATOR.

8. DEPTH INDICATOR MARK.

A DEPTH INDICATION MARK SHALL BE LOCATED ON THE FRONT (REFLECTIVE) FACE OF THE DRIVEABLE GROUND MOUNTED DELINEATOR UNIT AT A HEIGHT OF 18 INCHES FROM THE BOTTOM END OF THE UNIT WITH A WEATHER RESISTANT MARKING MATERIAL SO AS TO NOT WASH OFF OR WEATHER AWAY PRIOR TO UNIT INSTALLATION.

9. MOWABILITY.

GROUND MOUNTED DELINEATOR UNITS SHALL BE CAPABLE OF BEING MOWED OVER IN BOTH DIRECTIONS A TOTAL OF 20 TIMES (TEN EACH DIRECTION) BY A STANDARD DEPARTMENT FLAIL MOWER EQUIPPED WITH A FRONT MOUNTED DEFLECTOR AND ADJUSTED TO A MINIMUM MOWING HEIGHT OF 3 INCHES, WITHOUT DAMAGE. MOWABLE DRIVEABLE FLEXIBLE UNITS MUST FOLD PARALLEL AND FLAT TO THE GROUND SO AS TO NOT DEFLECT UPWARD AND INTO THE FLAIL MOWER MECHANISM PASSING ABOVE AND OVER THE DELINEATOR UNIT CAUSING ANY DAMAGE THERETO.

10. UNITS.

UNITS SHALL CONTAIN A MINIMUM OF 40 PERCENT UNIT CONSUMER RECYCLED MATERIAL IN ITS CONSTRUCTION.

11. SAMPLING RATE.

FIVE (5) SAMPLES PER LOT SIZE OF APPROXIMATELY 10,000 TO 20,000 UNITS WILL BE CHOSEN AT RANDOM BY THE ENGINEER FOR TESTING AT THE DEPARTMENT'S LABORATORY FACILITIES.

12. RETROREFLECTIVE SHEETING.

RETROREFLECTIVE SHEETING FOR FLEXIBLE DELINEATORS OF ALL TYPES SHALL BE TYPE IV-A CONFORMING TO SUBSECTION 916.04. THE COLOR SHALL BE WHITE WHEN THE DELINEATOR IS LOCATED ON THE RIGHT SIDE TO THE DIRECTION OF TRAFFIC AND SHALL BE YELLOW WHEN THE DELINEATOR IS LOCATED ON THE LEFT SIDE TO THE DIRECTION OF TRAFFIC.

CONSTRUCTION REQUIREMENTS.

(A) GROUND MOUNTED.

FLEXIBLE DELINEATOR UNITS SHALL BE CAPABLE OF BEING DRIVEN VERTICALLY INTO THE GROUND TO A MINIMUM DEPTH OF 18 INCHES BY MEANS OF A HAND DRIVER. THE PORTION OF THE DELINEATOR ABOVE GROUND SHALL BE ONE COMPONENT OR IF TWO OR MORE COMPONENTS ARE REQUIRED, THEY SHALL BE BONDED TOGETHER. THE UNIT MANUFACTURER SHALL PROVIDE INSTALLATION INSTRUCTIONS AND SHALL MAKE AVAILABLE ANY SPECIAL TOOLS REQUIRED FOR THE INSTALLATION OF THE UNITS. RETROREFLECTIVE SHEETING SHALL BE PRE-APPLIED TO THE FRONT (SURFACE FACING TRAFFIC) OF THE UNIT BY THE MANUFACTURER COVERING A MINIMUM AREA OF 3 INCHES BY 12 INCHES, BEGINNING A MAXIMUM OF 2 INCHES FROM THE TOP OF THE UNIT. UNITS SHALL BE INSTALLED SO THAT THE PLANE FACE OF THE CENTER OF THE RETROREFLECTIVE SHEETING IS AT AN ANGLE OF ZERO DEGREES WITH A PERPENDICULAR TO THE DIRECTION OF TRAFFIC.

(B) GUIDE RAIL MOUNTED.

FLEXIBLE DELINEATORS SHALL BE MOUNTED ON THE SPACER OF BEAM GUIDE RAIL USING EITHER A "U" CHANNEL BASE ON THE I-BEAM SPACER OR A FLAT BASE ATTACHED TO A WOOD, POLYMER OR OTHER SOLID TOP SPACER.THE BASE SHALL BE ATTACHED TO THE SPACER USING AN ADHESIVE RECOMMENDED BY THE MANUFACTURER OF THE BASE AND PANEL. THE FIRST DELINEATOR SHALL BE PLACED ON THE BEAM GUIDE RAIL END TREATMENT, POSITIONED SO THAT THE REFLECTOR AREA IS FACING THE DIRECTION OF TRAFFIC, THEN SUBSEQUENTLY EVERY 81.9 FEET (13 SECTIONS OF GUIDE RAIL) FOR TANGENT MAINLINE ROADWAY, EVERY 44.1 FEET (7 SECTIONS OF GUIDE RAIL) FOR CURVED MAINLINE ROADWAYS WITH RADII LESS THAN 1910 FEET. IF A PARABOLIC FLARE IN THE BEAM GUIDE RAIL EXISTS, THE SECOND DELINEATOR SHALL BE PLACED AT THE END OF THE FLARE SECTION WITH SUBSEQUENT DELINEATORS SPACED AS STATED ABOVE. IF THE DISTANCE BETWEEN THE END OF THE BEAM GUIDE RAIL IS GREATER THAN 20 FEET ON CURVED MAINLINE ROADWAYS OR 40 FEET ON TANGENT MAINLINE ROADWAYS, A DELINEATOR SHALL BE INSTALLED ON THE LAST POST OR END TREATMENT.

RETROREFLECTIVE SHEETING SHALL BE APPLIED TO THE UPPER PORTION OF THE FLEXIBLE DELINEATOR PANEL. THE RETROREFLECTIVE SHEETING SHALL COVER A MINIMUM AREA OF 4 1/2 INCHES BY 4 1/2 INCHES.

(C) BARRIER CURB MOUNTED.

THE FIRST DELINEATOR SHALL BE PLACED AT THE BEGINNING OF THE BARRIER CURB SECTION, POSITIONED SO THAT THE REFLECTOR AREA IS FACING THE DIRECTION OF TRAFFIC, THEN SUBSEQUENTLY EVERY 80 FEET.

IF THE DISTANCE BETWEEN THE END OF THE BARRIER CURB AND THE ADJACENT DELINEATOR IS GREATER THAN 40 FEET, A DELINEATOR SHALL BE INSTALLED AT THE END OF THE BARRIER CURB. DELINEATORS SHALL BE INSTALLED ON BOTH SIDES OF BARRIER CURB OPENINGS.

RETROREFLECTIVE SHEETING SHALL BE APPLIED TO THE PORTION OF THE FLEXIBLE DELINEATOR PANEL FACING TRAFFIC AND PERPENDICULAR TO THE TOP OF THE BARRIER CURB. THE RETROREFLECTIVE SHEETING SHALL COVER AN AREA OF 3 1/2 INCHES BY 3 1/2 INCHES.

METHOD OF MEASUREMENT.

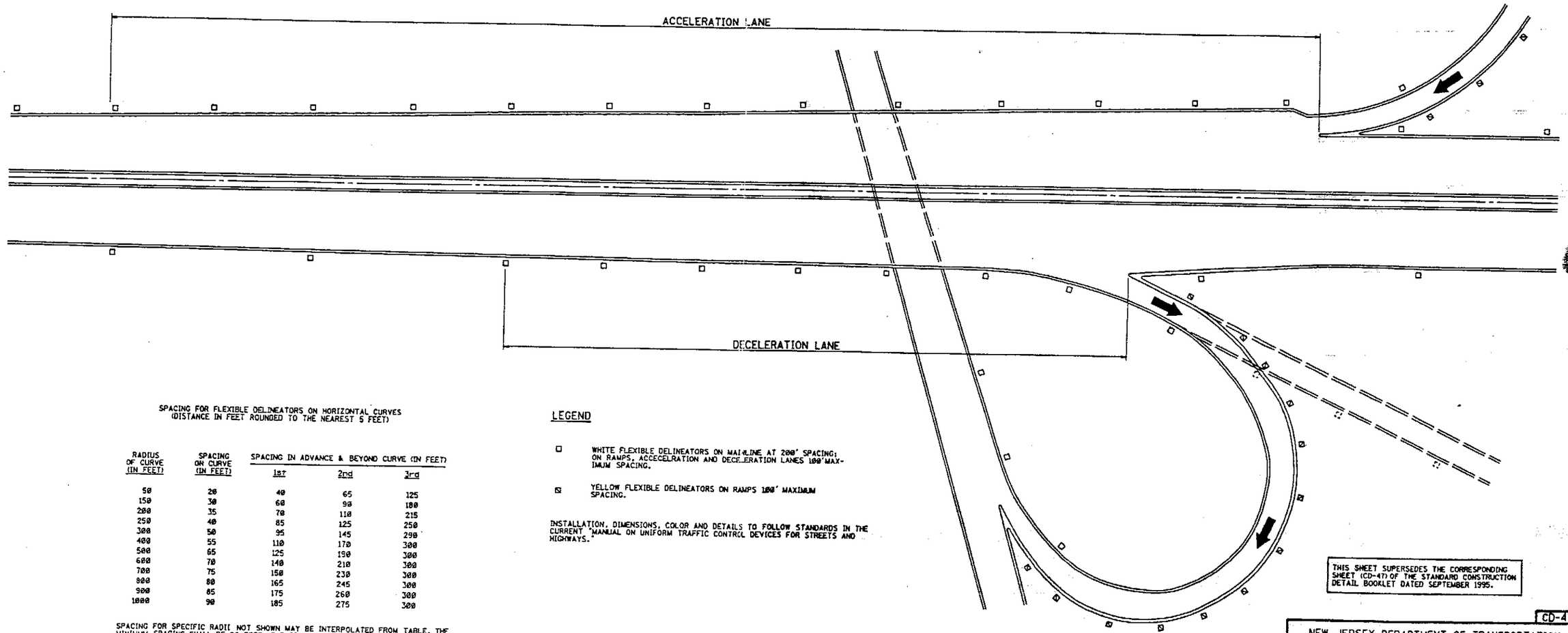
FLEXIBLE DELINEATORS WILL BE MEASURED BY THE NUMBER OF UNITS.

BASIS OF PAYMENT.

PAYMENT WILL BE MADE UNDER:

PAY ITEM	PAY UNIT
FLEXIBLE DELINEATORS, GROUND MOUNTED	UNIT
FLEXIBLE DELINEATORS, GUIDE RAIL MOUNTED	UNIT
FLEXIBLE DELINEATORS, BARRIER CURB MOUNTED	UNIT

STATE	FEDERAL PROJECT NO.	SHEET	TOTAL SHEETS
N.J.			



SPACING FOR FLEXIBLE DELINEATORS ON HORIZONTAL CURVES
(DISTANCE IN FEET ROUNDED TO THE NEAREST 5 FEET)

RADIUS OF CURVE (IN FEET)	SPACING ON CURVE (IN FEET)	SPACING IN ADVANCE & BEYOND CURVE (IN FEET)		
		1st	2nd	3rd
50	20	40	65	125
150	30	60	90	180
200	35	70	110	215
250	40	85	125	250
300	50	95	145	290
400	55	110	170	300
500	65	125	190	300
600	70	140	210	300
700	75	150	230	300
800	80	165	245	300
900	85	175	260	300
1000	90	185	275	300

SPACING FOR SPECIFIC RADII NOT SHOWN MAY BE INTERPOLATED FROM TABLE. THE MINIMUM SPACING SHALL BE 20 FEET. THE SPACING ON CURVES SHALL NOT EXCEED 300 FEET. IN ADVANCE OF OR BEYOND A CURVE, AND PROCEEDING AWAY FROM THE END OF THE CURVE, THE SPACING OF THE FIRST DELINEATOR IS 2S, THE SECOND 3S, AND THE THIRD 6S BUT NOT TO EXCEED 300 FEET. S REFERS TO THE DELINEATOR SPACING FOR SPECIFIC RADII COMPUTED FROM THE FORMULA $S = 3\sqrt{R - 50}$

LEGEND

- □ WHITE FLEXIBLE DELINEATORS ON MAINLINE AT 200' SPACING; ON RAMPS, ACCECELRATION AND DECELERATION LANES 100' MAXIMUM SPACING.
- ▣ YELLOW FLEXIBLE DELINEATORS ON RAMPS 100' MAXIMUM SPACING.

INSTALLATION, DIMENSIONS, COLOR AND DETAILS TO FOLLOW STANDARDS IN THE CURRENT "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS."

THIS SHEET SUPERSEDES THE CORRESPONDING SHEET (CD-47) OF THE STANDARD CONSTRUCTION DETAIL BOOKLET DATED SEPTEMBER 1995.

CD-47

NEW JERSEY DEPARTMENT OF TRANSPORTATION

CONSTRUCTION DETAILS

ADJ	103195	- FLEXIBLE DELINEATORS INCORPORATED
ADJ	822294	- NOTE ADDED
ADJ	112289	- CHANGED FEDERAL BLOCK
ADJ	872988	- ORIGINAL SHEET

Drafted by the Roadway C.A.D.D. Unit